



NILASAILA INSTITUTE OF SCIENCE & TECHNOLOGY  
SERGARH-756060, BALASORE (ODISHA)  
(Approved by AICTE & affiliated to SCTE&VT, Odisha)



## LESSON PLAN

**SUBJECT: Wave Propagation & Broadband Communication Engineering (TH-4)**

**Name Of The Faculty :-** Er. RAKESH KUMAR SETHI

**Branch :-** Electrical and Electronics Engineering

**Session :-** 2025-26

**Semester :-** 5th

**Examination :-** 2025 (W)

## CHAPTER WISE DISTRIBUTION OF PERIODS

Sl.No.	Name of the chapter as per the Syllabus	No. of Periods as per the Syllabus	No. of periods actually needed
1	WAVE PROPAGATION & ANTENNA	12	10
2	TRANSMISSION LINES	10	6
3	TELEVISION ENGINEERING	13	12
4	MICROWAVE ENGINEERING	15	20
5	BROADBAND COMMUNICATION	10	12
TOTAL		60	60

Sign of Faculty

Sign of H.O.D

<b>Name of the programme:</b> Diploma in Electrical & Electronics Engineering	<b>Semester:</b> 5th	<b>Name of the Teaching Faculty:</b> Er. Rakesh Kumar Sethi	
		<b>Academic Year :</b> 2025-26 <b>Examination :</b> 2025 (W)	
<b>Course Code:</b> TH-4	<b>Course Year:</b> Third Year	<b>No. of Classes Alloted Per Week :</b>	4
		<b>Planned Classes Required to Complete the Course</b>	60
<b>Week</b>	<b>Class Day</b>	<b>Topics to be Covered</b>	
1 <sup>st</sup>	1 <sup>st</sup>	<b>Unit-1: WAVE PROPAGATION &amp; ANTENNA</b> 1.1 Effects of environments such as reflection, refraction, interference, diffraction, absorption and attenuation (Definition only)	
	2 <sup>nd</sup>	1.2 Classification based on Modes of Propagation-Ground wave, lonosphere ,Sky wave propagation, Space wave propagation	
	3 <sup>rd</sup>	1.2 Classification based on Modes of Propagation-Ground wave, lonosphere ,Sky wave propagation, Space wave propagation	
	4 <sup>th</sup>	1.3 Definition – critical frequency, max. useable frequency, skip distance, fading, Duct propagation & Troposphere scatter propagation actual height and virtual height	
2 <sup>nd</sup>	1 <sup>st</sup>	1.4 Radiation mechanism of an antenna-Maxwell equation.	
	2 <sup>nd</sup>	1.5 Definition - Antenna gains, Directive gain, Directivity, effective aperture, polarization, input impedance, efficiency, Radiator resistance, Bandwidth, Beam width, Radiation pattern	
	3 <sup>rd</sup>	1.6 Antenna -types of antenna: Mono pole and dipole antenna and omni directional antenna	
	4 <sup>th</sup>	1.7 Operation of following antenna with advantage & applications. a) Directional high frequency antenna : , Yagi & Rohmbus only	

Week	Class Day	Topics to be Covered
3 <sup>rd</sup>	1 <sup>st</sup>	b) UHF & Microwave antenna.: Dish antenna (with parabolic reflector) & Horn antenna
	2 <sup>nd</sup>	1.8 Basic Concepts of Smart Antennas- Concept and benefits of smart antennas
	3 <sup>rd</sup>	<b>Unit-2: TRANSMISSION LINES.</b> 2.1 Fundamentals of transmission line. 2.2 Equivalent circuit of transmission line & RF equivalent circuit
	4 <sup>th</sup>	2.3 Characteristics impedance, methods of calculations & simple numerical. 2.4 Losses in transmission line
4 <sup>th</sup>	1 <sup>st</sup>	2.5 Standing wave – SWR, VSWR, Reflection coefficient, simple numerical.
	2 <sup>nd</sup>	2.6 Quarter wave & half wavelength line
	3 <sup>rd</sup>	2.7 Impedance matching & Stubs – single & double
	4 <sup>th</sup>	2.8 Primary & secondary constant of X-mission line.
5 <sup>th</sup>	1 <sup>st</sup>	<b>Unit-3: TELEVISION ENGINEERING.</b> 3.1 Define-Aspect ratio, Rectangular Switching. Flicker, Horizontal Resolution, Video bandwidth, Interlaced scanning, Composite video signal, Synchronization pulses
	2 <sup>nd</sup>	3.2 TV Transmitter – Block diagram & function of each block
	3 <sup>rd</sup>	3.3 Monochrome TV Receiver -Block diagram & function of each block.
	4 <sup>th</sup>	3.4 Colour TV signals (Luminance Signal & Chrominance Signal, ( I & Q,U & V Signals).

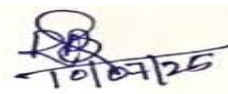
Week	Class Day	Topics to be Covered
6 <sup>th</sup>	1 <sup>st</sup>	3.5 Types of Televisions by Technology- cathode-ray tube TVs, Plasma Display Panels, Digital Light Processing (DLP), Liquid Crystal Display (LCD)
	2 <sup>nd</sup>	Organic Light-Emitting Diode (OLED) Display, Quantum Light-Emitting Diode (QLED) – only Comparison based on application
	3 <sup>rd</sup>	3.6 Discuss the principle of operation - LCD display, Large Screen Display
	4 <sup>th</sup>	3.6 Discuss the principle of operation - LCD display, Large Screen Display
7 <sup>th</sup>	1 <sup>st</sup>	3.7 CATV systems & Types & networks
	2 <sup>nd</sup>	3.8 Digital TV Technology-Digital TV Signals, Transmission of digital TV signals & Digital TV receiver Video programme processor unit.
	3 <sup>rd</sup>	3.8 Digital TV Technology-Digital TV Signals, Transmission of digital TV signals & Digital TV receiver Video programme processor unit.
	4 <sup>th</sup>	3.8 Digital TV Technology-Digital TV Signals, Transmission of digital TV signals & Digital TV receiver Video programme processor unit.
8 <sup>th</sup>	1 <sup>st</sup>	<b>Unit-4: MICROWAVE ENGINEERING.</b> 4.1 Define Microwave Wave Guides.
	2 <sup>nd</sup>	4.2 Operation of rectangular wave guides and its advantage
	3 <sup>rd</sup>	4.2 Operation of rectangular wave guides and its advantage
	4 <sup>th</sup>	4.3 Propagation of EM wave through wave guide with TE & TM modes

Week	Class Day	Topics to be Covered
9 <sup>th</sup>	<sub>1</sub> <sup>st</sup>	4.3 Propagation of EM wave through wave guide with TE & TM modes
	<sub>2</sub> <sup>nd</sup>	4.4 Circular wave guide
	<sub>3</sub> <sup>rd</sup>	4.5 Operational Cavity resonator.
	<sub>4</sub> <sup>th</sup>	4.5 Operational Cavity resonator.
10 <sup>th</sup>	<sub>1</sub> <sup>st</sup>	4.6 Working of Directional coupler, Isolators & Circulator.
	<sub>2</sub> <sup>nd</sup>	4.7 Microwave tubes-Principle of operational of two CavityKlystron.
	<sub>3</sub> <sup>rd</sup>	4.7 Microwave tubes-Principle of operational of two CavityKlystron.
	<sub>4</sub> <sup>th</sup>	4.7 Microwave tubes-Principle of operational of two CavityKlystron.
11 <sup>th</sup>	<sub>1</sub> <sup>st</sup>	4.7 Microwave tubes-Principle of operational of two CavityKlystron.
	<sub>2</sub> <sup>nd</sup>	4.8 Principle of Operations of Travelling Wave Tubes
	<sub>3</sub> <sup>rd</sup>	4.8 Principle of Operations of Travelling Wave Tubes
	<sub>4</sub> <sup>th</sup>	4.9 Principle of Operations of Cyclotron
12 <sup>th</sup>	<sub>1</sub> <sup>st</sup>	4.9 Principle of Operations of Cyclotron
	<sub>2</sub> <sup>nd</sup>	4.9 Principle of Operations of Cyclotron
	<sub>3</sub> <sup>rd</sup>	4.10 Principle of Operations of Tunnel Diode & Gunn diode
	<sub>4</sub> <sup>th</sup>	4.10 Principle of Operations of Tunnel Diode & Gunn diode

Week	Class Day	Topics to be Covered
13 <sup>th</sup>	1 <sup>st</sup>	<b>Unit-5: Broadband communication</b> 5.1 Broadband communication system-Fundamental of Components and Network architecture
	2 <sup>nd</sup>	5.1 Broadband communication system-Fundamental of Components and Network architecture
	3 <sup>rd</sup>	5.1 Broadband communication system-Fundamental of Components and Network architecture
	4 <sup>th</sup>	5.2 Cable broadband data network- architecture, importance & future of broadband telecommunication internet based network.
14 <sup>th</sup>	1 <sup>st</sup>	5.3 SONET(Synchronous Optical Network)-Signal frame components topologies advantages applications, and disadvantages
	2 <sup>nd</sup>	5.3 SONET(Synchronous Optical Network)-Signal frame components topologies advantages applications, and disadvantages
	3 <sup>rd</sup>	5.3 SONET(Synchronous Optical Network)-Signal frame components topologies advantages applications, and disadvantages
	4 <sup>th</sup>	5.3 SONET(Synchronous Optical Network)-Signal frame components topologies advantages applications, and disadvantages
15 <sup>th</sup>	1 <sup>st</sup>	5.4 ISDN - ISDN Devices interfaces, services, Architecture, applications,
	2 <sup>nd</sup>	5.4 ISDN - ISDN Devices interfaces, services, Architecture, applications,
	3 <sup>rd</sup>	5.5 BISDN -interfaces & Terminals, protocol architecture applications
	4 <sup>th</sup>	5.5 BISDN -interfaces & Terminals, protocol architecture applications



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